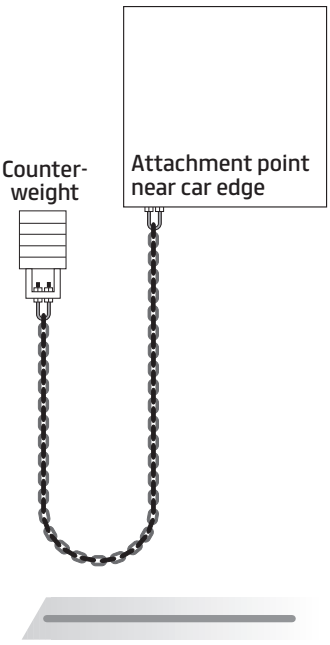
# Compensation Cable Loop Width vs. Performance

TECH TIP 8

Compensating cable gets its name because it compensates for the weight of suspension ropes to balance (dynamically and mechanically) the elevator system. Specifically, it compensates for the weight of the suspension means as it is played out to move the car up and down the hoistway. This Technical Tip addresses issues about compensating cable that have become more common as elevators go higher and faster.

## THE SITUATION

Originally, compensation was provided by lengths of bare chain or sash cord chain. These were cheaper alternatives to wire rope. While chain and sash cord were inexpensive, they were also quite noisy.

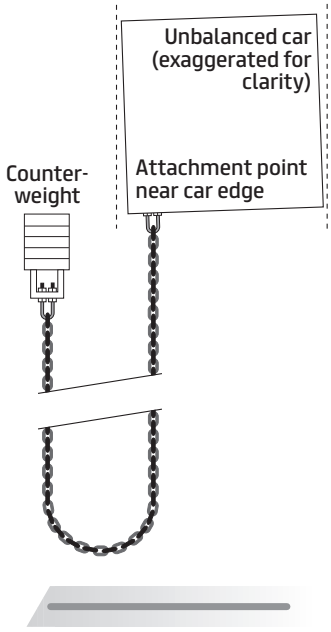



Compensating cable came about as a way to make chain quieter. Most compensating cables are some version of a coated chain and are about as flexible as chain. This was intentional; since compensation cable often replaced chain, it needed to form the same narrow loop as chain to connect to the same support points underneath the car and counterweight.

## THE NARROW LOOP AND THE ATTACHMENT POINTS

Compensation forms a loop as it hangs from its attachment points. The width of that loop depends on the flexibility of the compensation. Like the materials it replaced, compensating cable forms a fairly narrow natural loop. Note that the compensation is attached near the edge of the car because of this narrow loop.

Maintaining this natural loop is essential to safe operation of the elevator. A wider-than-specified loop width can cause the cable to swing around excessively in the pit. This can be dangerous and damaging; excessive cable sway allows the cable to potentially grab or entangle with buffers, buffer switches, mounting brackets and other pit equipment. If a cable entanglement occurs, there is risk to public safety and of damage to pit and/or hoistway equipment. Therefore, the attachment point must be where the cable's natural loop takes it.




## HOW AN OFF-CENTER ATTACHMENT POINT LIMITS PERFORMANCE

Elevator manufacturers determined that a hang length of approximately 122 m • 400 feet for bare chain compensation was about the maximum length for balance if the chain's support point was near the edge of the car. (NOTE: maximum hang length for modern compensating cable is based on the strength of its support member and not the balance of the elevator.)

However, the issue is not so much as the length as it is the weight. 400 or more feet of compensation can unbalance the car and degrade its performance, especially in side-counterweight configurations.

There are a couple of methods in use to counterbalance long lengths of compensation. Some companies actually supply static weights that hang from the car opposite the compensation attachment point. While this does counterbalance the compensation, it lowers the capacity and overall performance of the car by making it heavier.

Another method is to install additional compensating cable like a traveling cable opposite the primary compensation attachment point. This dynamically counterbalances the compensating cable(s) and is a more suitable solution than static weights. However, this method adds the costs of cable, support hardware and installation time while continuing to reduce the car's capacity because of the extra weight.

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(cont'd)



## TRAVELING CABLE AS COMPENSATION CABLE

It seems that the answer is to use compensation that has a wider natural loop to permit center attachment.

Traveling cable has been used as compensating cable for many years. It meets the requirement for a wider loop and its stable tracking during operation usually requires only a single sway reduction roller or device.

However, it is not the ideal solution. Traveling cable costs roughly four times as much as the compensation cable it replaces. Traveling cable also has to be securely supported at both ends in order to prevent premature breakdown of the conductors that can cause twisting and poor tracking.

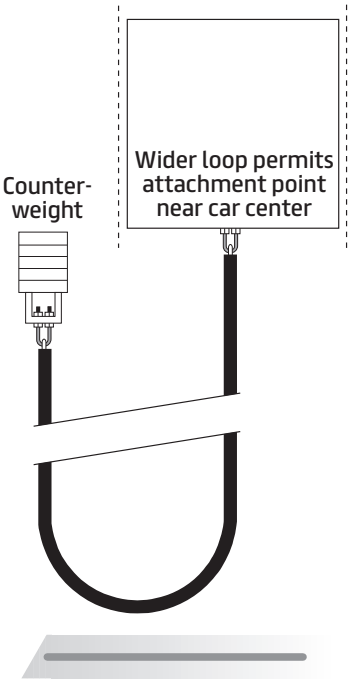
Another problem: when traveling cable is used as compensation, the cable must be occasionally shortened as the suspension ropes stretch over time. (It is much more difficult to shorten traveling cable than compensation cable.)

## THE ANSWER - COMPENSATION CABLE WITH A WIDER LOOP

Whisper-Flex® compensation cable has a standard loop width of a little over 60 cm • 2 feet. It would seem that the best answer would be to produce a chain-based compensation cable with a wider natural loop that matched up to the size of a standard elevator car, more like 1.2 m • 4 feet.

Steadi-Flex® compensation cable, with a loop width of approximately four feet, has been developed to meet this demand. Its wider loop width (approx. 1.22 m • 4 ft) allows the cable to be supported or terminated near the center of the car for improved balance and ride quality.

Steadi-Flex provides the best solution for elevators with side-counterweight configurations, or with hang lengths over 400 feet that have balancing issues. Elevators currently using traveling cable as compensation now have a low-cost solution for replacement that matches its stable tracking performance. Little or no sway reduction is needed.




## CONCLUSION

Wide-loop compensating cables will offer the best combination of price and performance for long hang lengths and for elevators with balance/performance issues such as side counterweight configurations.

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